REMARKS

The Official Action mailed October 19, 2006 has been carefully considered. Reconsideration and allowance of the subject application, as amended, are respectfully requested. The Examiner's statement regarding the priority claim of the present application is noted. No further discussion of this issue is believed necessary. Claim 1 has been amended to clarify some of the salient inventive features, and claims 2 and 3 have been cancelled, without prejudice. No new matter has been added as a result of the changes made thereto.

Claims 1-3 and 7-13 stand rejected under 35 USC 103 as being unpatentable over Williams (6,087,110) in view of JP-2002369407 in view of Potega (6,459,175). Applicants respectfully submit this rejection is in error.

Claim 1 has been amended, inter alia, to include:

> a unidirectional switch coupled to said first path to allow selective coupling of said controllable DC power source to said system load via said common node;
>
> a selectively unidirectional switch coupled to said second path to allow selective coupling of said battery to said common node; and
>
> a power management control circuit configured to control the conduction state of said unidirectional switch to a closed position to enable said controllable DC power source to supply power to said system load via said common node, said power management control circuit is further configured to control the conduction state of said selectively unidirectional switch to a first closed position to enable said rechargeable battery to supply power to said system load via said common node and to prevent a current flow from said controllable DC power source to said rechargeable battery;
>
> wherein when said unidirectional switch is in said closed position and said selectively unidirectional switch is in said first closed position, said controllable DC power source and said rechargeable battery are coupled in parallel with said system load in a parallel power supply mode to permit both said controllable DC power source and said rechargeable battery to concurrently supply power to said system load.

Thus, claim 1 as currently amended includes limitations directed to preventing a current flow into the battery when both the unidirectional and selectively unidirectional switches are closed (ON), and further requires that, when these switches are closed, the DC power source and

the rechargeable battery are coupled in parallel with the load to concurrently deliver power to the load.

Before addressing the Examiner's rejection in detail, Applicant's provide below a brief assessment of the Williams reference.

In prior art Figure 1, Williams teaches that switches S1, S2 and S3 should not be on simultaneously (Column 1, lines 53-55). The reason for this is to prevent cross conduction between, for example, the AC/DC converter (C3) and the primary battery B1. However, Williams recognizes that certain MOSFET switches may "leak", i.e., the body diode of a given switch may cause some level of cross-conduction, depending on the relative potential of the switches. For example, in Prior art Figure 2A, Williams recognizes that if the potential of B1 is greater than the potential of the bus B (and if switch S1 is off (as shown)), the body diode (shown in shadow in this figure) of switch S1 would need to be biased towards the battery B1. This arrangement would prevent the battery from "leaking" current towards the bus B. If, however, the potential of the bus B is greater than the battery B1 (and if switch S1 is off (as shown)) the body diode (also shown in shadow in this figure) of switch S1 would need to be biased towards the bus B. This would prevent cross-conduction of current from the bus B to the battery B1.

Williams concludes that conventional MOSFET switches are not capable of preventing leakage in both directions, i.e., conventional MOSFET switches are not capable of blocking bidirectional currents (Column 2, lines 57-59). One prior art solution, as described by Williams, is to have two MOSFET switches back-to-back (Figures 6A-6C), however, such an arrangement will add cost to the overall circuit and increase the resistance of the switching arrangement.

Accordingly, Williams proposes to solve the switch leakage problem by with a new MOSFET switch design that is capable of blocking bidirectional currents. Williams recognizes however, even with their new MOSFET switch design, that only one of switches S1, S2 or S3 should be on at any given time, while the new switch design prevents leakage when the other switches are off.

The Examiner appears to characterize Williams as teaching a situation in which both S1 and S3 would be ON. For example, the Examiner calls out the following language:

> The use of a source-body short has the effect of creating a diode across the drain and body terminals of the MOSFET which is electrically in parallel with the MOSFET (Column 2, Lines 44-46); and
>
> If the polarity of the voltages across the switches were reversed, the antiparallel diodes would become forward biased. (Column 2, lines 63-65)

The Examiner concludes by stating "[i]n other words both switches S1 and S3 would be on." (Office Action, Page 4). Applicants respectfully disagree.

Contrary to the Examiner's assertion, these statements, when read in context of Figures 1, 2 and 3, simply state in other words the problem of leakage of an off switch, i.e., switches that are not capable of blocking bidirectional currents.

As stated, Applicant's independent claim 1 requires "...wherein when said unidirectional switch is in said closed position and said selectively unidirectional switch is in said first closed position, said controllable DC power source and said rechargeable battery are coupled in parallel with said system load in a parallel power supply mode to permit both said controllable DC power source and said rechargeable battery to concurrently supply power to said system load." (Emphasis added)

In sum, Williams teaches a MOSFET switch design capable of blocking bidirectional currents in the context of a power supply topology in which only one switch (among switches S1, S2 and S3 shown in Figure 1) is on at any given time. In other words, Williams does not disclose or suggest a power supply topology in which both the AC/DC converter C3 and one of the batteries (V1 or V2) are coupled in parallel to the load L to concurrently supply power to the load. Indeed, Williams specifically teaches that switches S1, S2 and S3 should not be on simultaneously, and thus, Williams could not teach a parallel power supply topology. Thus, Williams actually teaches away from the requirements of claim 1.

The Examiner points to JP-2002369407 (US equivalent Published Patent Application No. 2002/0186576) as teaching a power supply topology in which a secondary battery 4 is connected to the output side of an AC/DC converter 3 to provide a discharge current when the load requirements exceed the capacity of the converter 3. Applicants agree with the Examiner's characterization of this reference.

However, a key point of the topology provided by the JP reference is that the secondary battery 4 and the AC/DC converter 3 are never in parallel to supply power to the load. The reason for that is simple: the battery 4 must be coupled to the load through the DC to DC converter 5. In other words, the DC/DC converter 5 is used to boost the voltage of the battery 4. It is not the battery that directly provides the power to the load. Without the DC/DC converter, the battery could not operate to supply power to the load. In addition, without the DC/DC converter 5, the topology provided in this reference would suffer from cross conduction between the battery 4 and the AC/DC converter 3 if voltages between the battery and the AC/DC converter are different.

Finally, the Examiner points to Potega as providing a controllable DC power source. Applicants agree that Potega so discloses.

However, no combination of these three references teach the concept of a battery and controllable DC power source coupled in parallel with load to concurrently supply power to the load. These are key distinguishing features of the present invention set forth in claim 1, as amended, that cannot be achieved by combining the cited references. Accordingly, it is respectfully submitted that the Examiner's rejection of the claims as being obvious over Williams in view of JP-2002369407 and in view of Potega is in error and should be withdrawn.

Having dealt with all the objections raised by the Examiner, it is respectfully submitted that the present application, as amended, is in condition for allowance. Thus, early allowance is earnestly solicited.

If the Examiner desires personal contact for further disposition of this case, the Examiner is invited to call the undersigned Attorney at 603.668.6560.

In the event there are any fees due, please charge them to our Deposit Account No. 50-2121.

Respectfully submitted,
Bucur et al.

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